Off-Road Motorcycle Certification

Darin Johnson

American Honda Motor Company Inc.

Topics

- Deterioration Factors and Emission Levels
- Warranty and Maintenance Requirements

OFMC Standards

The Off-road motorcycle standards phase in over two years.

Phase in (Percent)	**Emission Standards (g/km)**		**Maximum allowable Family emission limits**	
	HC+NOx	**CO**	**HC+NOx**	**CO**
2006 = 50%	2.0	25	20.0	50
2007 and later = 100%				

Deterioration Factors

- Deterioration Factors (DF) show a relationship between the exhaust emissions at the end of the useful life and emissions level at a low hour point.

Deterioration Factors

- Establishing a deterioration factor provides the benefit of reducing the testing burden if later changes are made to an engine family.
- Deterioration factors must take into account available data as well as good engineering judgment.
- Small-volume manufacturers may use assigned deterioration factors that EPA establishes.

Deterioration Factors

- DFs for vehicles that use after treatment devices (i.e. Catalyst or PAIR) are multiplicative.
- DFs for vehicles that do not use after treatment devices are additive.
- Manufacturers can ask EPA to approve deterioration factors for an engine family based on emission measurements from similar vehicles or engines.

Deterioration Factors

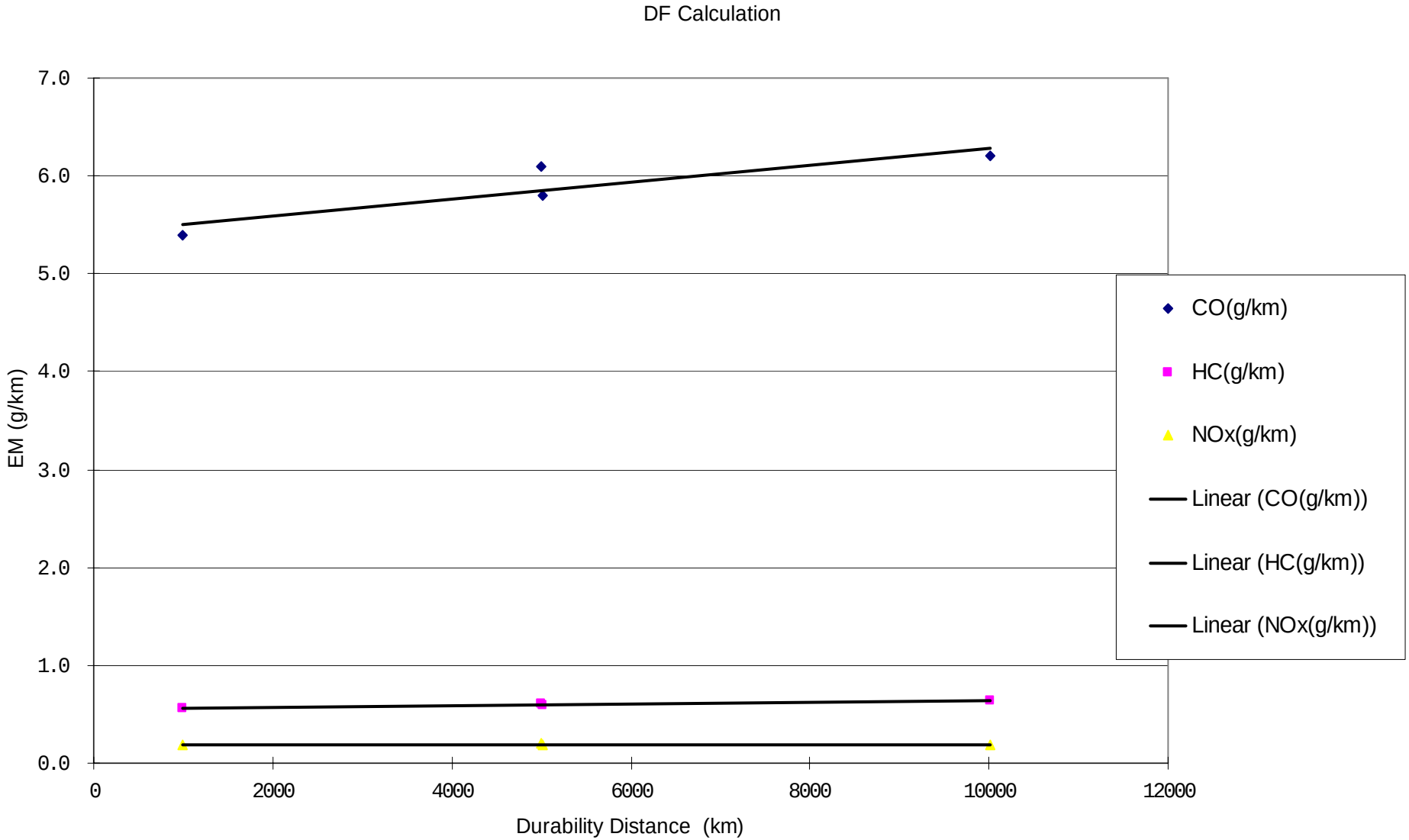
- Use a linear least-squares fit of your test data to calculate your deterioration factor.
- Operate the vehicle or engine over a representative duty cycle for the useful life (in hours or kilometers).
- Manufacturers may ask to use other testing methods to determine deterioration factors, consistent with good engineering judgment.

Testing to Establish Deterioration Factors

X	Y			
Service Accumulation (km)	**CO (g/km)**	HC (g/km)	NOx (g/km)	**HC+NOx (g/km)**
988	5.4	0.56	0.18	0.74
5000	6.1	0.61	0.20	0.81
5012	5.8	0.59	0.19	0.78
10010	6.2	0.64	0.19	0.83
	↓	↓	↓	↓
CL (EPA)	**6**	0.6	0.2	**0.8**
CL (ARB)	**6.2**	**0.6**	N/A	N/A
STD (g/km)	25/15.0	1.2	N/A	2
Y=aX+b				
a (SLOPE)	8.62954E-05	8.81163E-06	9.79938E-07	N/A
b (INTERCEPT)	5.421733578	0.553716932	0.184852875	
Interpolated value @ 1K	5.5080	0.5625	0.1858	
Extrapolated value @ 10K	6.2847	0.6418	0.1947	
Additive DF	**0.8**	**0.08**	**0.01**	
Multiple DF	**1.14**	**1.14**	**1.05**	

Testing to Establish Deterioration Factors

(continued)



How to Apply Deterioration Factors
(Additive; without aftertreatment)

Official Test Results	Test #1		DF		Certification Emission	Cert. Level
CO	5.4	+	0.8	=	6.2	6
HC	0.56	+	0.08	=	0.64	---
NOx	0.18	+	0.01	=	0.19	---
HC+NOx	---		---		0.83	0.8

Maintenance

- Non-Critical emissions-related maintenance.
- Critical emission-related maintenance.
- Non-emission-related maintenance.
- Special maintenance.

Non-critical emission-related maintenance

Non-critical emissions related maintenance cannot be performed on the test vehicle.

The maintenance schedule may recommend any amount of non-critical emission-related maintenance as long the owners manual indicates that these steps are not necessary to keep the emission warranty valid.

Owners failure to do this maintenance does not disqualify a a vehicle from in-use testing or warranty coverage.

Critical emission-related maintenance.

Emission related maintenance performed on the test vehicle is considered "Critical".

This includes adjustment, cleaning, repair, or replacement of emission-related components.

Maintenance within the minimum useful life period is not allowed for the following critical emission-related components:

- After-treatment devices (i.e. Catalysts)
- Pulse-air valves
- Fuel injectors
- Oxygen sensors
- Electronic control units
- Superchargers or turbochargers.

Critical emission-related maintenance.

Demonstrate that the critical emission-related maintenance is likely to be done in-use.

To demonstrate that the maintenance is likely to occur, satisfy any of the following criteria:

- Show that lack of maintenance
  - increases emissions and;
  - unacceptably degrades vehicle performance.
- Show that at least 80% of vehicles will get the maintenance.
- Provide the maintenance free of charge and inform the customer that it’s free.
- Otherwise convince EPA that the maintenance is likely to be done.

Example Maintenance Schedule

Maintenance Schedule

Maintenance Procedures:
I: inspect and clean, adjust, lubricate, or replace, if necessary
C: clean
A: adjust
L: lubricate
R: replace

	ITEMS \ FREQUENCY	WHICHEVER COMES FIRST ⇨		INITIAL MAINT.	REGULAR MAINT. INTERVAL		Refer to page
		mi		100	600	1200	
		km		150	1000	2000	
		NOTE	HOURS	20	100	200	
*	FUEL LINE					I	—
*	THROTTLE OPERATION					I	102
	AIR CLEANER				C	C	99
	AIR CLEANER HOUSING DRAIN TUBE	NOTE 1			I	I	101
	SPARK PLUG	NOTE 2			I	I	110
*	VALVE CLEARANCE			I	I	I	113
	ENGINE OIL			R	R	R	91
	ENGINE OIL FILTER			R	R	R	95
*	ENGINE OIL STRAINER SCREEN IN OIL TANK					C	—
*	ENGINE IDLE SPEED			I	I	I	109

Maintenance Schedule

	ITEMS \ FREQUENCY	WHICHEVER COMES FIRST ⇨		INITIAL MAINT.	REGULAR MAINT. INTERVAL		Refer to page
		mi		100	600	1200	
		km		150	1000	2000	
		NOTE	HOURS	20	100	200	
	DRIVE CHAIN	NOTE 1,2		I,L	(I,L EVERY 300mi (500km) or 50 operating hours)		139
	DRIVE CHAIN SLIDER				I	I	141
*	BRAKE FLUID	NOTE 3			I	I	122
*	BRAKE PAD WEAR	NOTE 1,2				I	126
*	BRAKE LIGHT SWITCH			I	I	I	128
	BRAKE SYSTEM			I	I	I	122
*	REVERSE LOCK SYSTEM			I	I	I	108
	SKID PLATES, ENGINE GUARD				I	I	138
*	CLUTCH SYSTEM			I	I	I	104
*	SUSPENSION				I	I	116
*	SPARK ARRESTER				C	C	114
*	NUTS, BOLTS, FASTENERS			I		I	—
**	WHEELS/TIRES			I	I	I	131,173
**	STEERING SHAFT HOLDER BEARINGS					I	—
**	STEERING SYSTEM					I	—

* Should be serviced by your Honda dealer, unless you have the proper tools and service data and are mechanically qualified. Refer to the official Honda Service Manual (page 198).
** In the interest of safety, we recommend these items be serviced only by your Honda dealer.

Warranty

The Emission Control System Warranty must be provided to the original purchaser and subsequent purchasers. The warranty period must be for at least half (1/2) of the useful.

Useful Life

Off Road Motorcycles

≤ 70 cc: 5 Years 5,000 kilometers
> 70 cc: 5 Years 10,000 kilometers

ATVs

< 100 cc:	5 Years 5,000 kilometers or 500 hours
≥ 100 cc:	5 Years 10,000 kilometers or 1,000 hours

On Road Motorcycles

Class I-A	5 Years	6,000 kilometers (3,728 miles)
Class I-B	5 Years	12,000 kilometers (7,456 miles)
Class II	5 Years	18,000 kilometers (11,185 miles)
Class III	5 Years	30,000 kilometers (18,641 miles)

Sample Emissions Warranty Parts List

Fuel Metering System:

Carburetor
Carburetor Air Jet Solenoid Valve
Carburetor Coolant Thermal Valve
Starting Enrichment Thermal Valve
Starting Enrichment Valve
Idle Air Control Valve
Intake Manifold
Fuel Filter
Throttle Body
Fuel Injector
Fuel Pressure Regulator
Fuel Pump

Air Injection System:

Pulse Secondary Air Injection Check Valve
Pulse Secondary Air Injection Control Valve
Pulse Secondary Air Injection Solenoid Valve

Ignition System:

Engine Coolant Temperature Sensor
Gear Position Switch
Ignition Coils
Ignition Control Module
Ignition Pulse Generator
Distributor Ignition Capacitor
Spark Plug (covered to the first replacement only)
Spark Plug Cap
Spark Plug Wires
Cam Position Sensor
Vehicle Speed Sensor
Engine Control Module
BARO Sensor
Throttle Position Sensor
MAP Sensor
Knock Sensor

Sample Emissions Warranty Parts List
(continued)

Shot Air System:

Intake Air Shot Air Check Valve

Intake Air Shot Air Valve

Exhaust System:

Catalytic Converter

Oxygen Sensor

Heated Oxygen Sensor

Exhaust Gas Control Valve

Exhaust Manifold

Exhaust Pipes (to the catalyst and between catalysts)

Air Fuel Ratio Sensor

Intake Air Temperature System:

Intake Air Temperature Check Valve

Intake Air Temperature Sensor

Intake Air Temperature Thermal Vacuum Valve

Intake Air Temperature Valve

Crankcase Emission Control System:

Air Cleaner

(covered up to the first replacement only)

Air Cleaner Housing

Air Cleaner Housing Cover

Crankcase Breather Separator

Crankcase Breather Storage Tank

Crankcase Breather Tube Plug

Reed Valve

Oil Filler Cap

Solenoid Valve

Parts Associated with the Systems Above:

FI Indicator Light Bulb, Malfunction Indicator Light Bulb, Tubing, Fittings, Clamps, Gaskets, Hoses, and Mounting Hardware

Sample Off-highway Motorcycle Application

(see attached PDF file)